Insights Moving Toward a Data Management System

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Force Application Division

Timely Support for Air Force Decision Makers

Past Studies and Analyses

- **Each branch did independent:**
  - **Studies**
  - **Analyses**
  - **Data Collection**
  - **Model Runs**
  - **Study Reports**

Result of Independent Studies

- Enormous time to “build” extens scenarios and databases
- Lengthy time to delivery
- Not always able to respond rapid quick taskings
- Lack coordination
- Poorly linked
- Potential for conflicting results

Doing More With Less

- More taskings
- Less manpower
- Enormous amounts of data
- Customers requesting shorter turnaround times

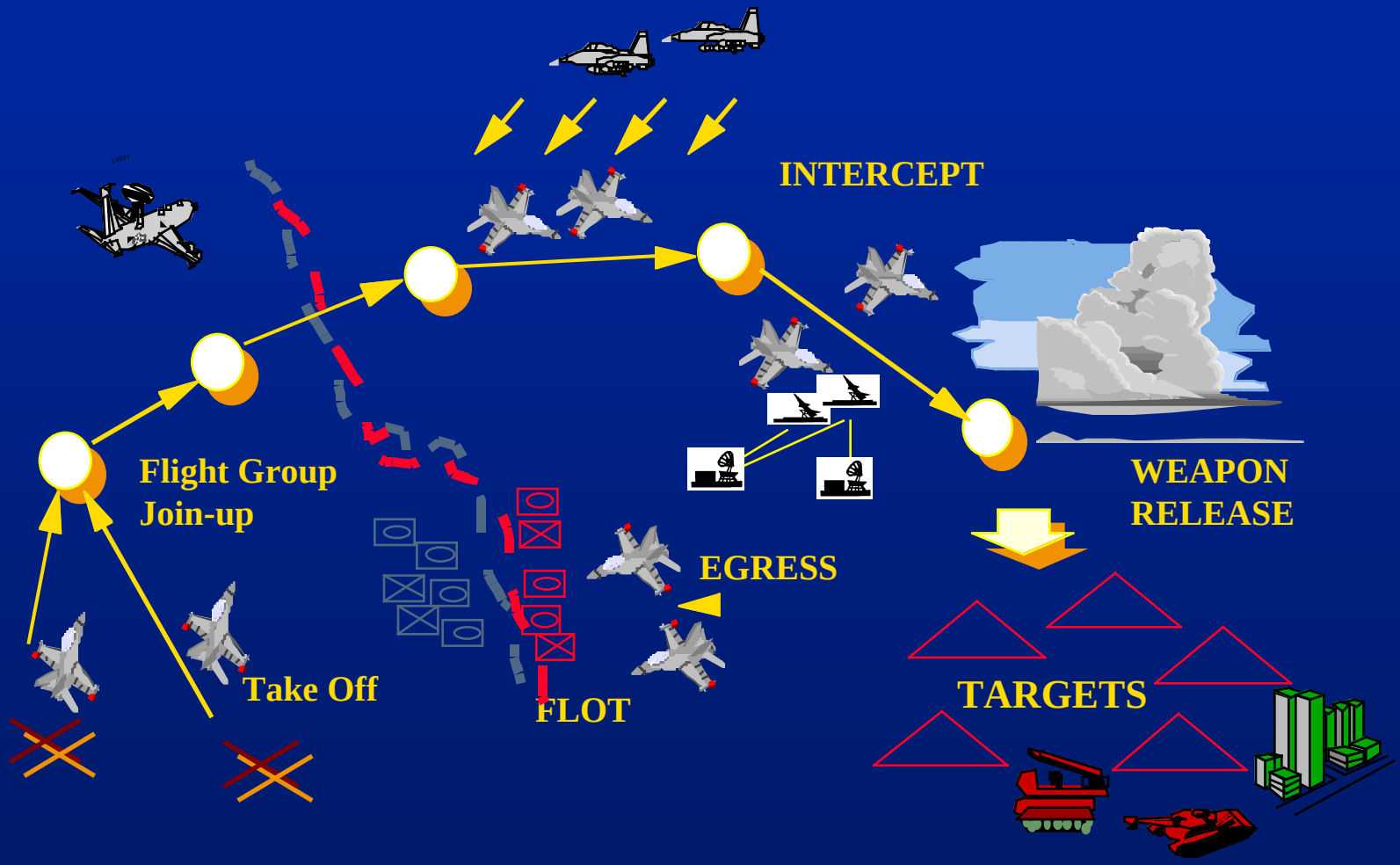
FROM LOTS OF MANPOWER

NOW

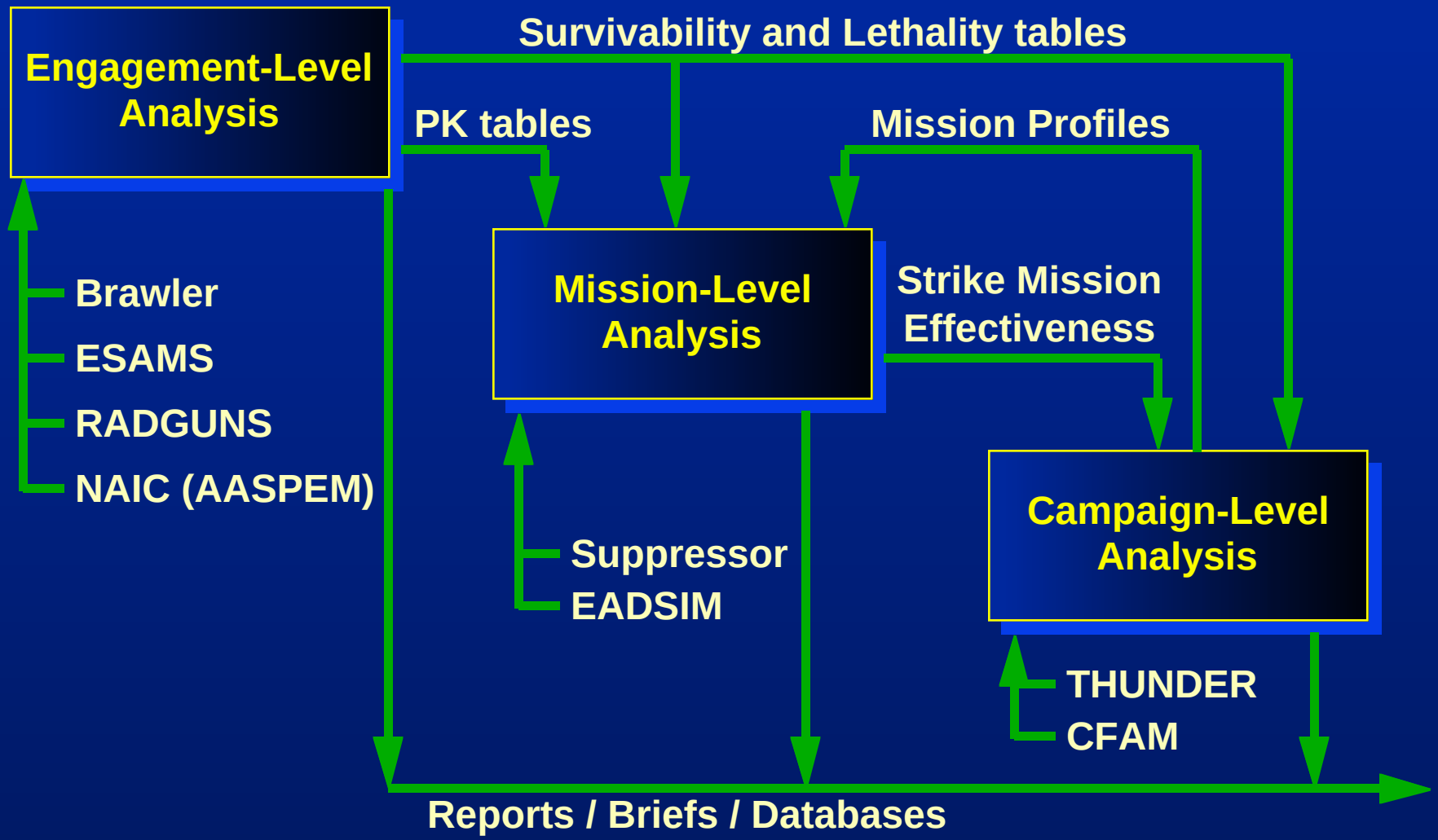
Future

- More groups doing interrelated projects
- Sharing data
- Model outputs that feed as inputs to other models and input data
- Tie into military worth
- Excursions done off of baselines

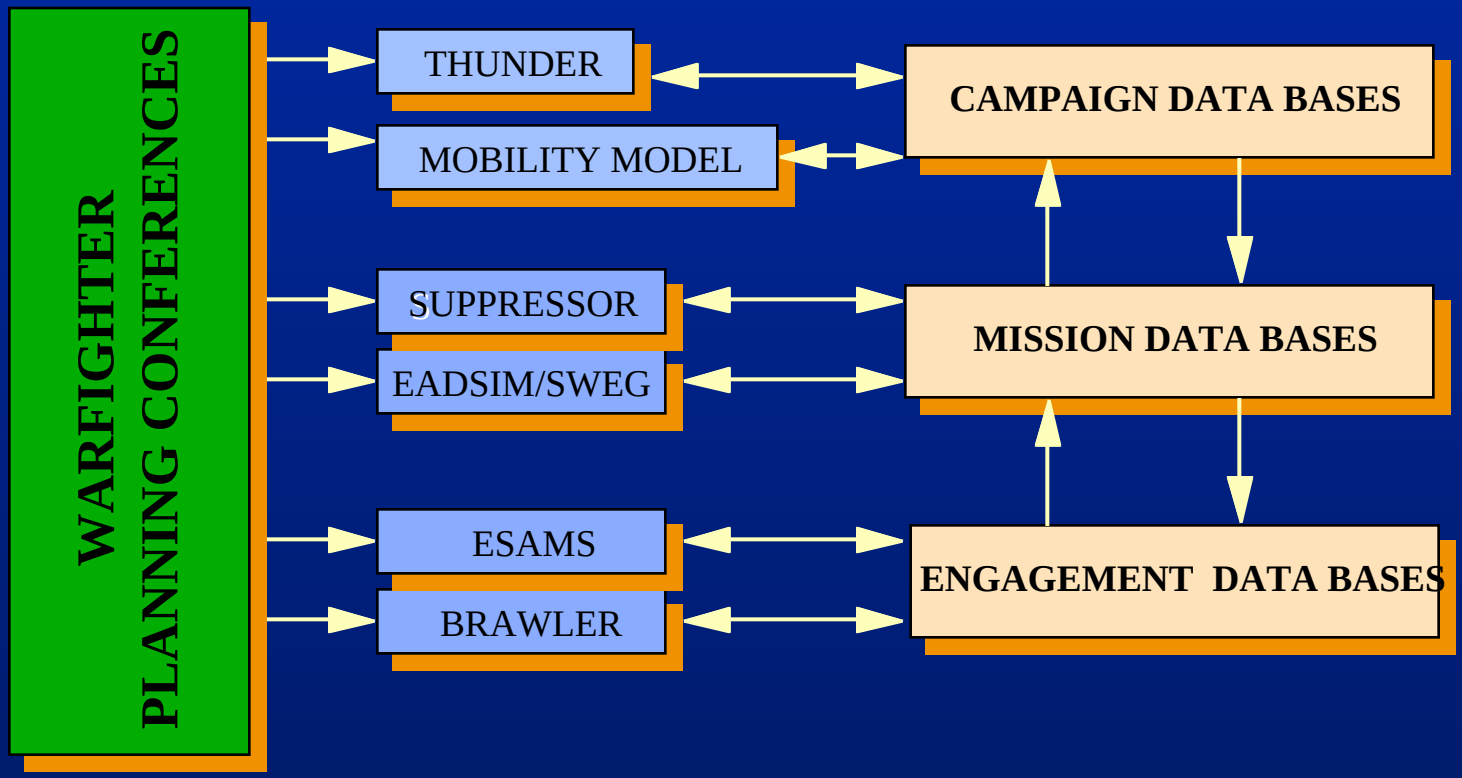
Ensuring Credible and Consistent Results From Standardized Data



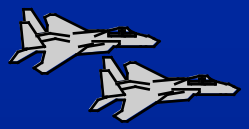
Data Flow Methodology

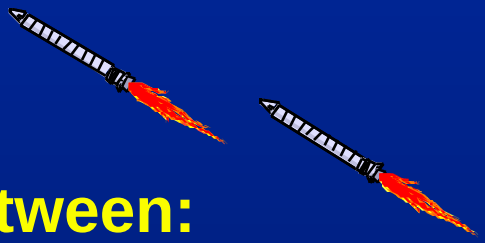


Linking Hierarchy of Models



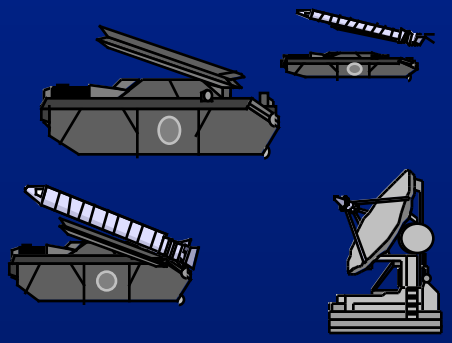
Linkages of Various Databases Required



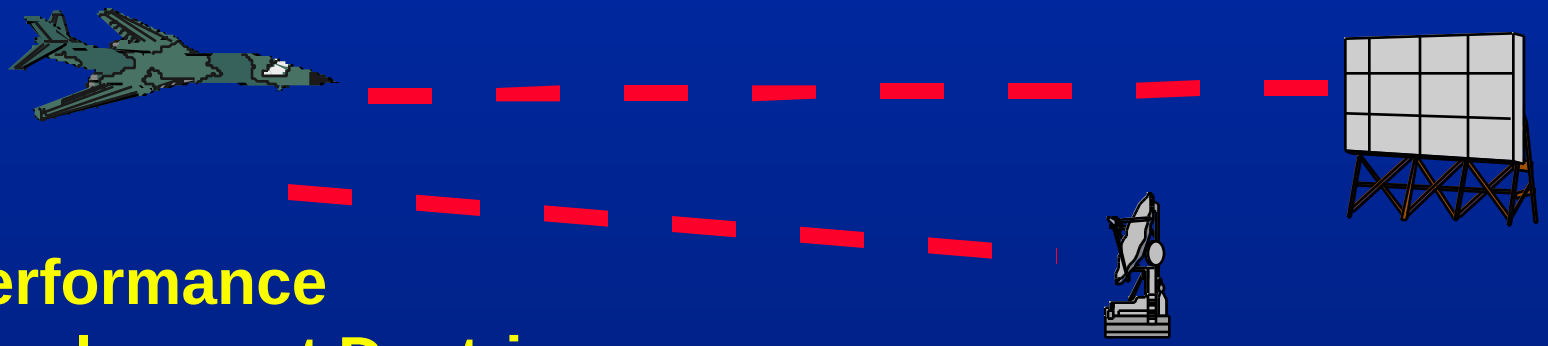


Data linkages required between:

- **Radar**
- **Aircraft**
- **Missile**



Radar Characteristics



Performance
Employment Doctrine
Standard Target #
C2 Hierarchy
TELS Linked

Aircraft Characteristics

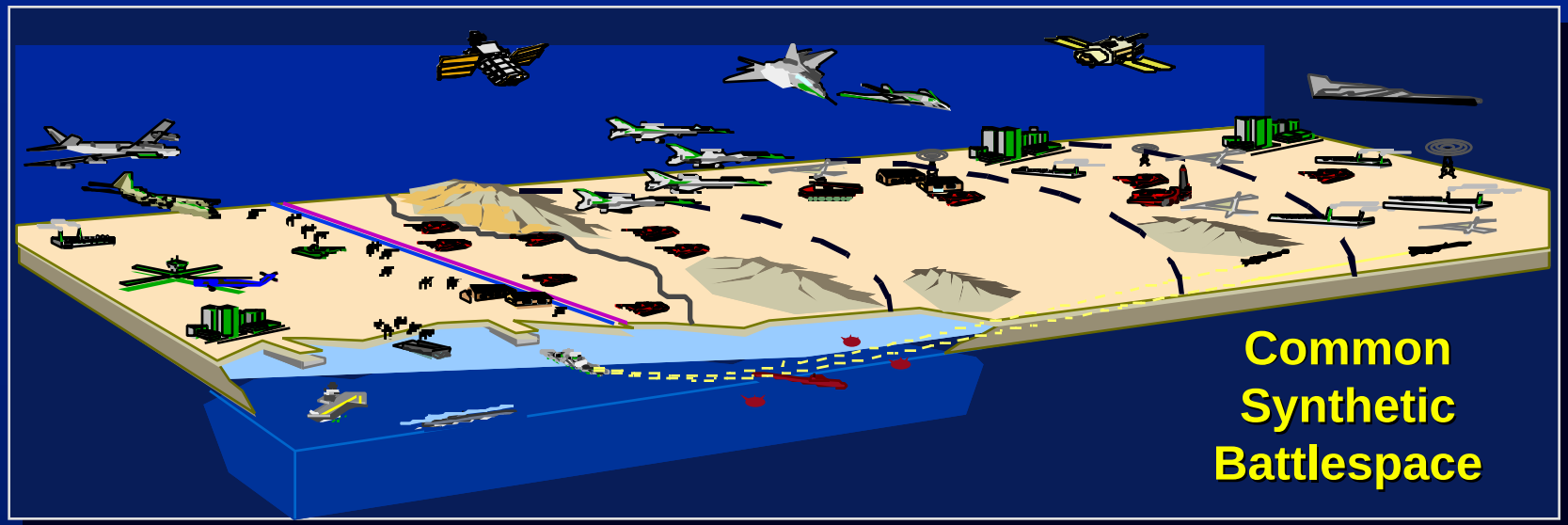
- RCS
- Radar
- Communications
- Weapons
- Fuel Tanks
- Altitude

SA Missile/TEL Characteristics

- Range/Lethal Range
- Lethal Altitude
- Flight Dynamics
- Maneuver/G Limits
- Altitude/Airspeed
- RCS Signature
- IR signature

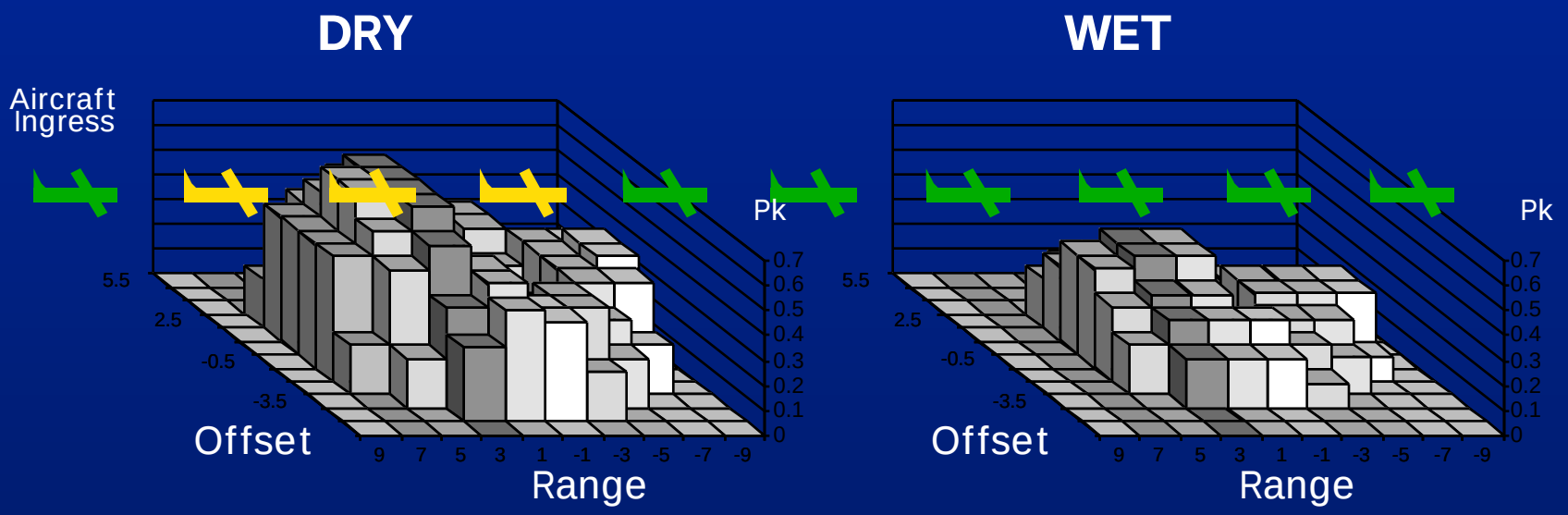
Visualizing Battlespace 3D

- Qualitative presentation of information
- Visualize data through time to help enhance the analysis of and decision making process in the Air Force Synthetic Battle Space

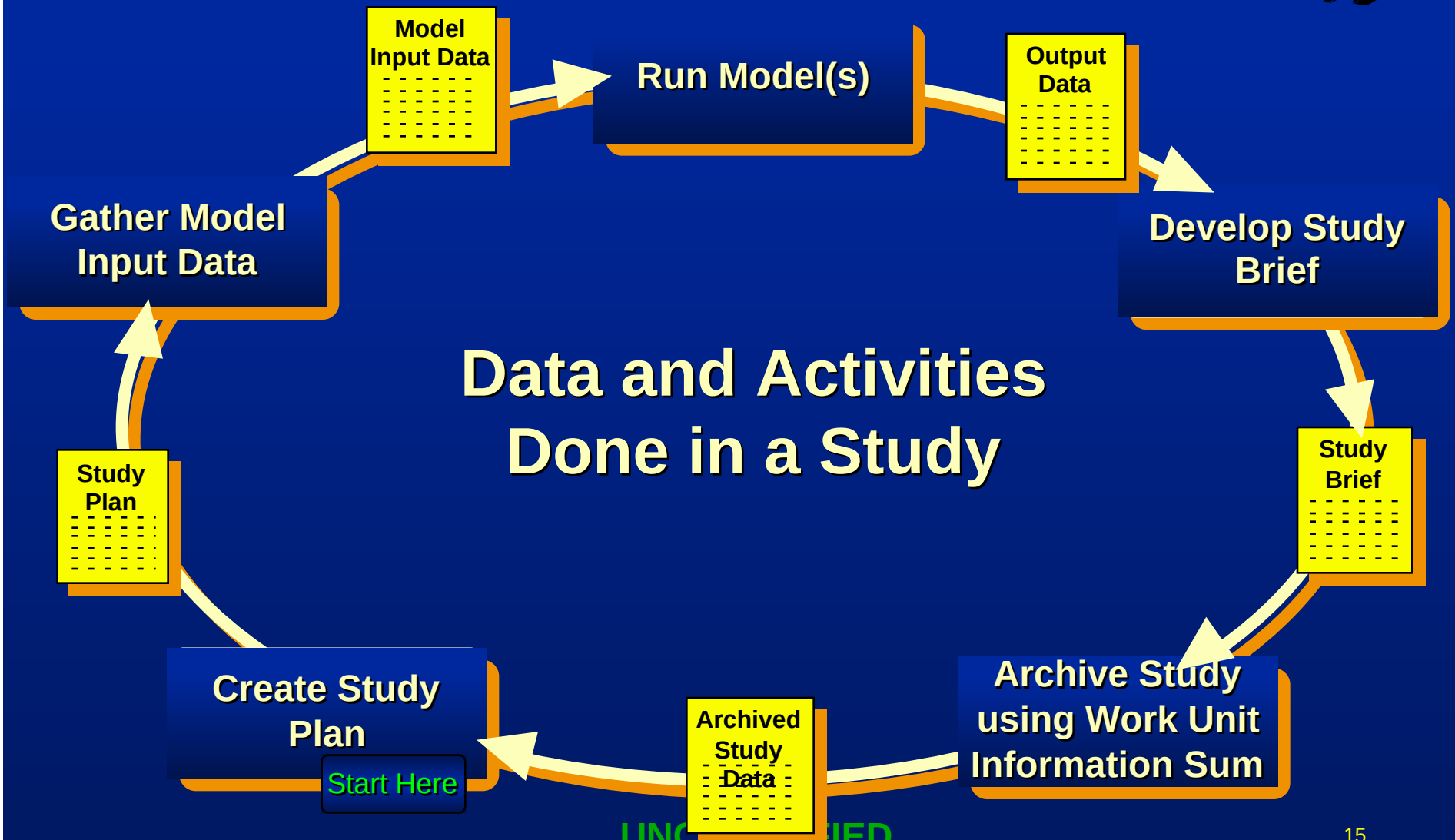


Viewing Data in Qualitative Form

ESAMS Pk Data



What Data to Capture?



Pitfalls of Data Management

$$$

Large upfront cost to build data management infrastructure

Time consuming effort to build data management system

Lack of staff to provide development and support

Pitfalls of Data Management

Not able to keep up with changing technologies:

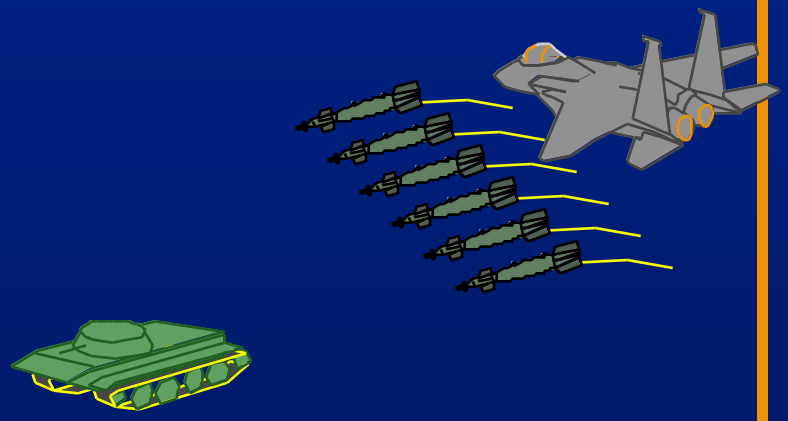
- **UNIX, Windows 95, Windows NT, OS/2**
- **Java, C++, Ada, Tcl/Tk, Visual Basic, FORTRAN**
- **Oracle, Sybase, Access, Informix**



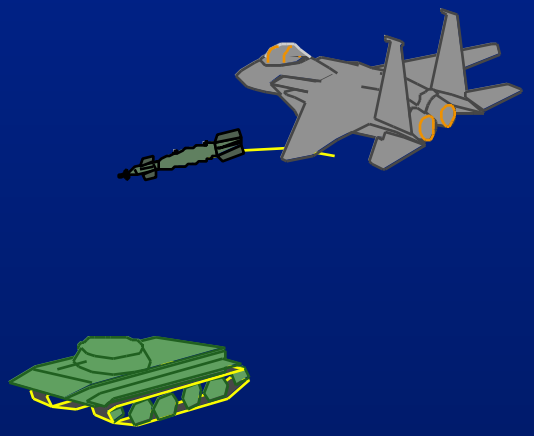
Difficult and Time Consuming to Incorporate Additional Models

- **Example: Exact same data in one campaign model has a significant difference in outcome when used in another campaign model**

Campaign Model X



Campaign Model Y



Lack of Standardized Data

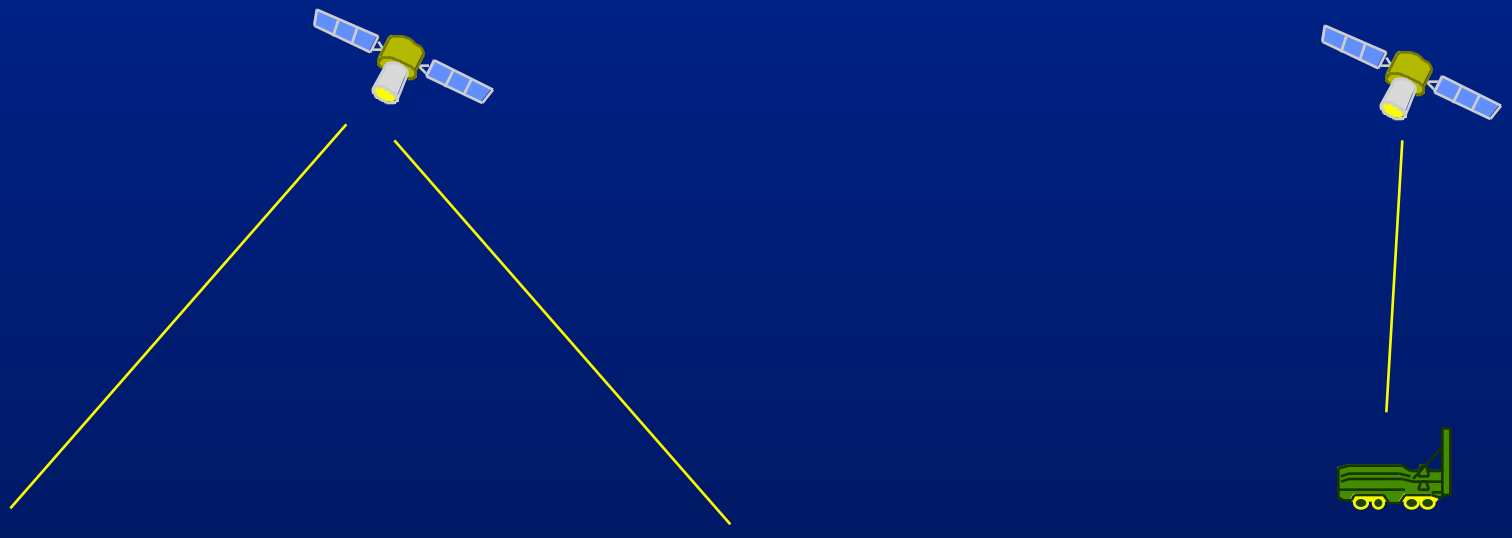
Analysts cannot use the same data for each study/analysis because of varying:

- **Level of detail - Campaign/Mission/Engagement**
- **Specs Data vs Real Test Data vs Intel Derived**
- **Original baseline data skewed**

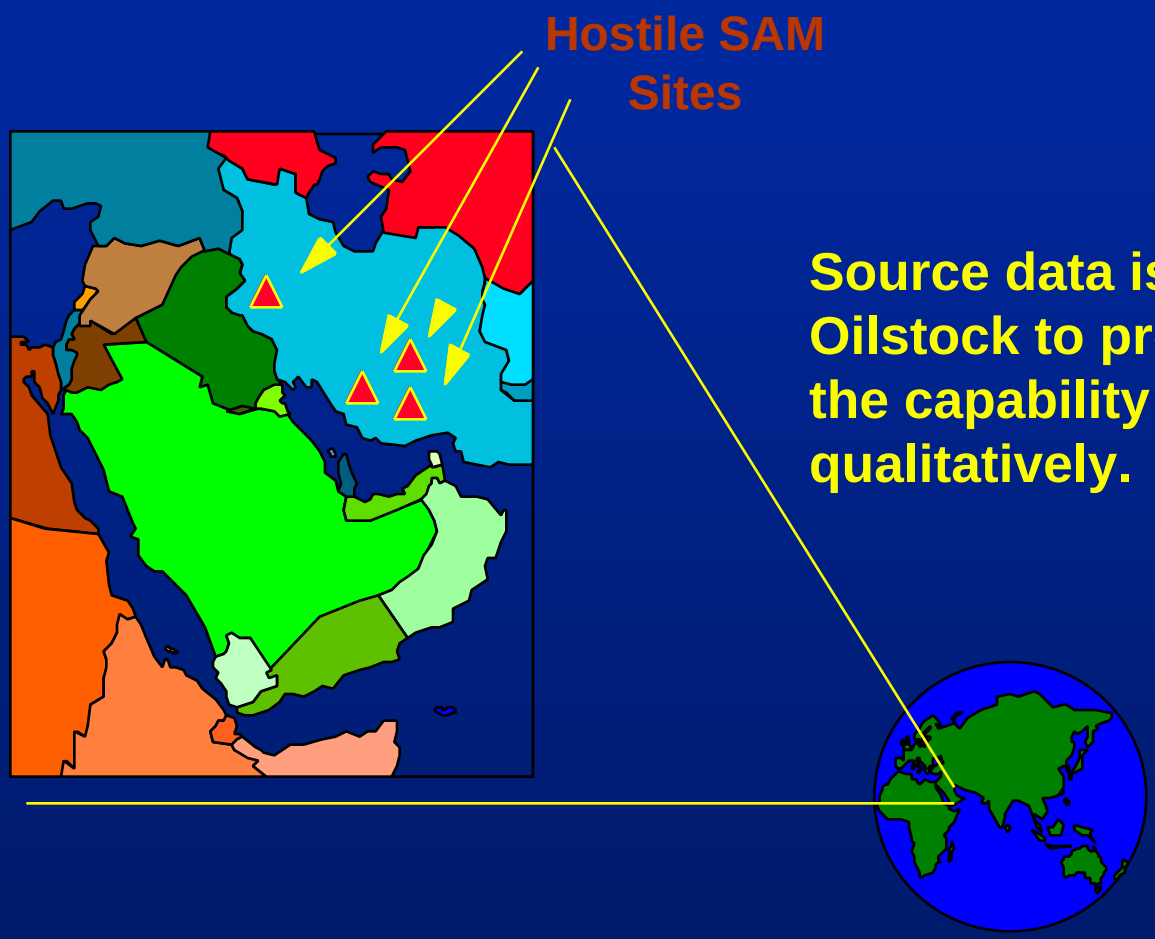
The Right Data is Difficult to Capture

Capturing the right data requires expertise in:

- How source data developed
- Understanding which models used
- What studies and analyses this data will impact
- Prioritizing which data to capture



Success in Mapping Data

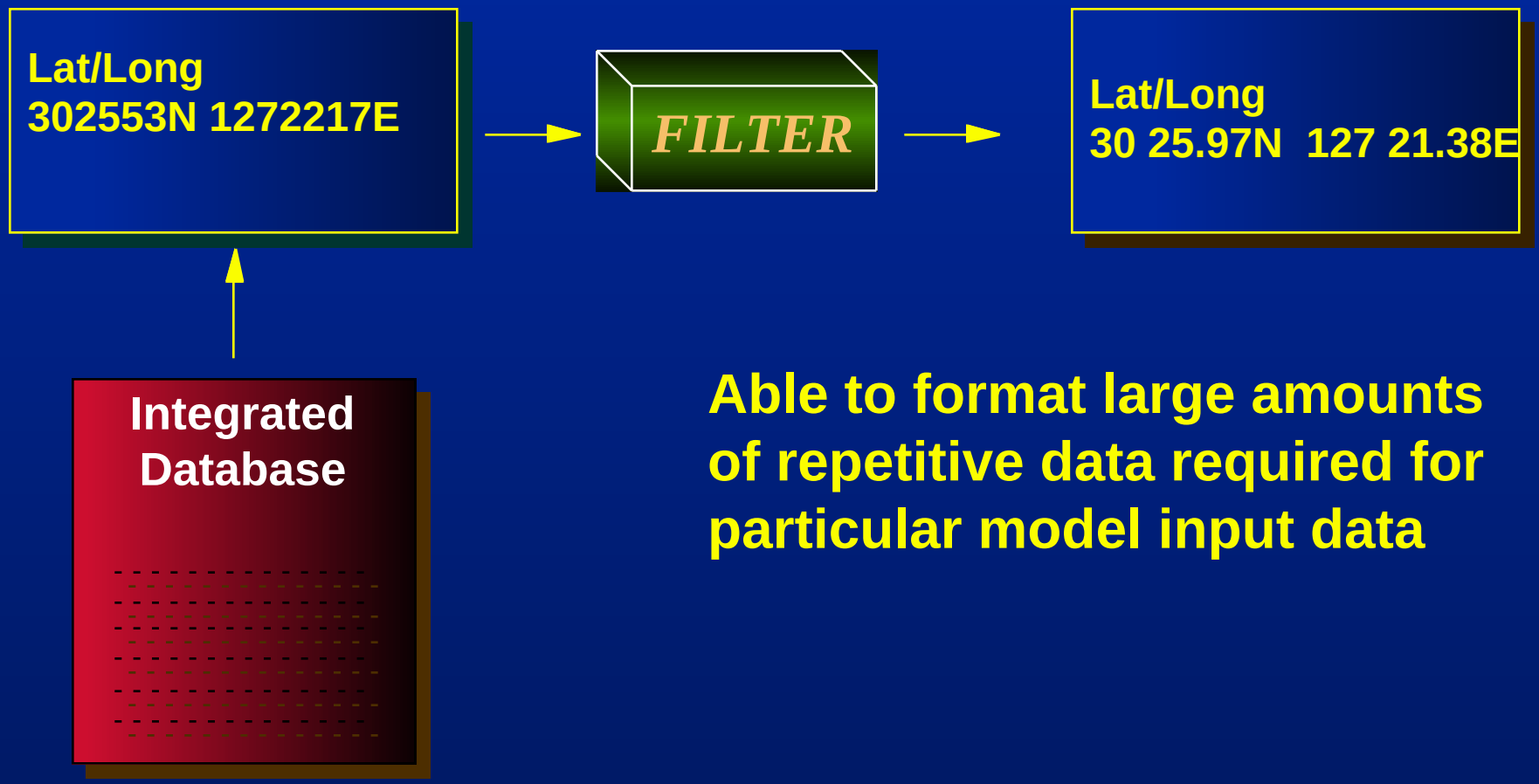


Source data is integrated with Oilstock to provide analysts the capability of viewing data qualitatively.

Data Management Successes

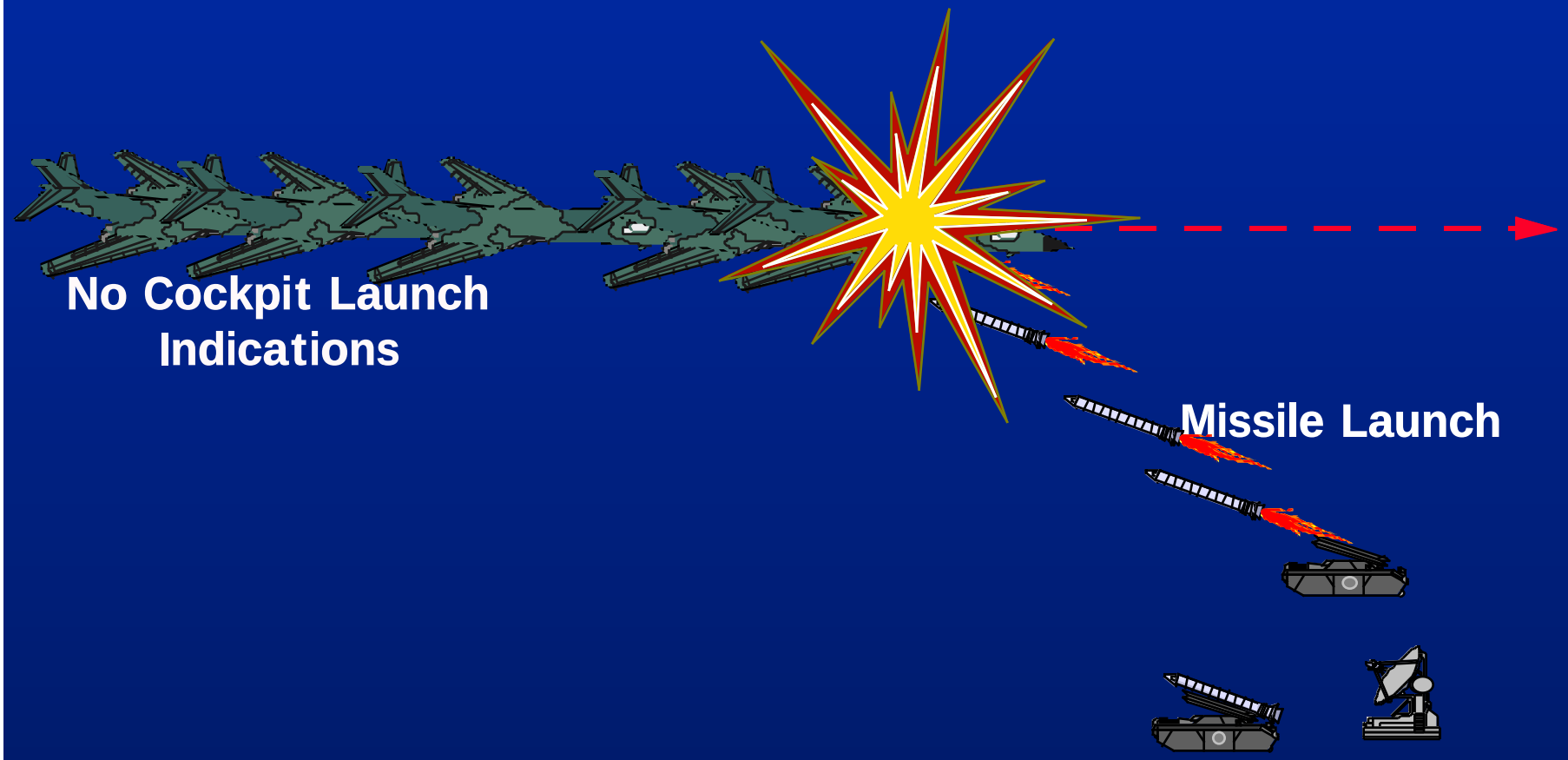
- Load raw data from multiple sources
- Automation of repetitive tasks/calculations
- Transforming source data into model data
- Capturing model output data

Success in Automation of Repetitive Data Tasks



Able to format large amounts of repetitive data required for particular model input data

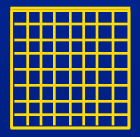
Success Example of Capturing Model Data: ESAMS Output Data



ESAMS Data Intensive Model Output

10 minutes per Rep

5 - 30 reps per condition (offset, range)



200 Conditions per grid

5 grids per volume

1 - 100+ volumes per study

Example of one ESAMS Grid

UP-RANGE

DOWN-RANGE

OFFSET

	50.6	45.9	41.2	36.5	31.8	27.1	22.4	17.7	13.0	8.3	3.6	1.1	5.8	10.5	15.2	19.9	24.6
45.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40.0	0.000	0.000	0.000	0.000	0.003	0.070	0.074	0.134	0.174	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.000
35.0	0.000	0.000	0.019	0.028	0.148	0.111	0.155	0.169	0.229	0.306	0.356	0.282	0.316	0.000	0.000	0.000	0.000
30.0	0.000	0.037	0.090	0.207	0.164	0.203	0.242	0.426	0.404	0.423	0				000	0.000	0.000
25.0	0.000	0.151	0.220	0.182	0.270	0.426	0.357	0.410	0.391	0.438	0				527	0.000	0.000
20.0	0.028	0.229	0.190	0.380	0.388	0.379	0.420	0.414	0.518	0.471	0				530	0.440	0.000
15.0	0.110	0.204	0.345	0.325	0.349	0.378	0.391	0.441	0.458	0.377	0.473	0.554	0.628	0.615	0.499	0.497	0.000
10.0	0.201	0.369	0.408	0.382	0.370	0.346	0.422	0.407	0.425	0.303	0.119	0.000	0.369	0.548	0.567	0.502	0.261
5.0	0.187	0.336	0.314	0.294	0.170	0.329	0.342	0.380	0.085	0.062	0.000	0.000	0.243	0.432	0.226	0.522	0.345
0.0	0.294	0.338	0.319	0.295	0.292	0.337	0.270	0.390	0.000	0.000	0.000	0.000	0.055	0.308	0.269	0.244	0.265
5.0	0.187	0.336	0.314	0.294	0.170	0.329	0.342	0.380	0.085	0.062	0.000	0.000	0.243	0.432	0.226	0.522	0.345
10.0	0.201	0.369	0.408	0.382	0.370	0.346	0.422	0.407	0.425	0.303	0.119	0.000	0.369	0.548	0.567	0.502	0.261
15.0	0.110	0.204	0.345	0.325	0.349	0.378	0.391	0.441	0.458	0.377	0.473	0.554	0.628	0.615	0.499	0.497	0.000
20.0	0.028	0.229	0.190	0.380	0.388	0.379	0.420	0.414	0.518	0.471	0.464	0.531	0.587	0.530	0.440	0.000	
25.0	0.000	0.151	0.220	0.182	0.270	0.426	0.357	0.410	0.391	0.438	0.421	0.567	0.572	0.527	0.000	0.000	
30.0	0.000	0.037	0.090	0.207	0.164	0.203	0.242	0.426	0.404	0.423	0.526	0.514	0.470	0.406	0.000	0.000	0.000
35.0	0.000	0.000	0.019	0.028	0.148	0.111	0.155	0.169	0.229	0.306	0.356	0.282	0.316	0.000	0.000	0.000	0.000
40.0	0.000	0.000	0.000	0.000	0.003	0.070	0.074	0.134	0.174	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

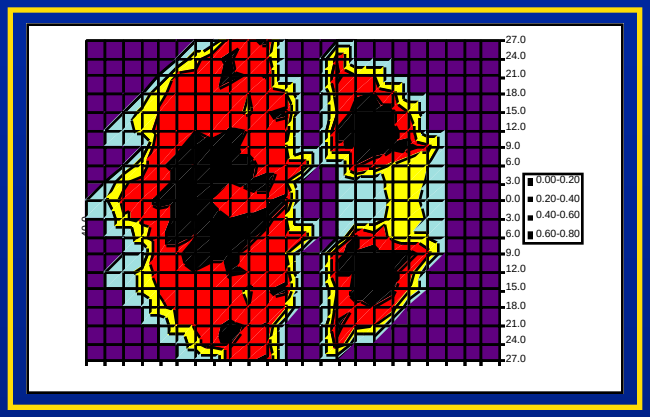
SAM SITE

P_K

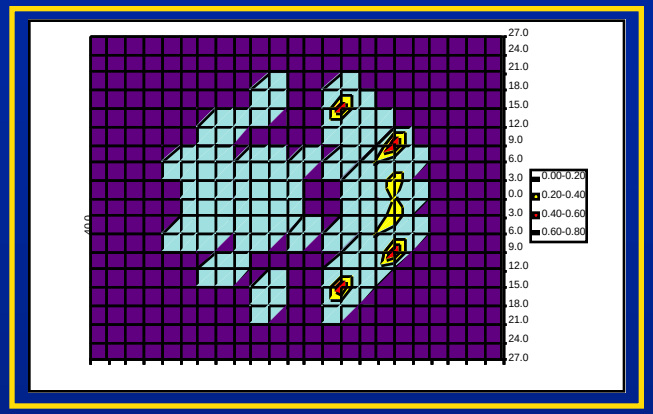
AIRCRAFT HEADING

ompleted Grid is Equivalent to Single SAM Located on 0/0 Axi
Incorporating 200 Launch Geometries

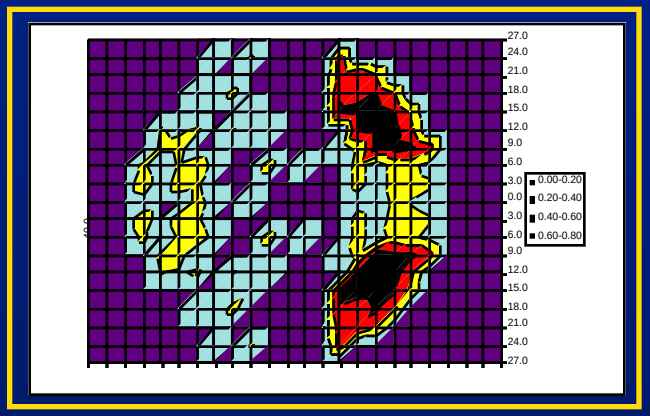
ESAMS Data Captured



DRY



WET



BASELINE

Study Management Data Captured

Study Plan

Name of study	Two major regional conflicts
POC	SAGC
Customer	SAF/AQ
Start Date	15 Jan 97

Work Unit Info Summary

Name of study	Two major regional conflicts
POC	SAGC
Type of aircraft	F-15E
Kill ratio	X : Y

Study Management Data Captured

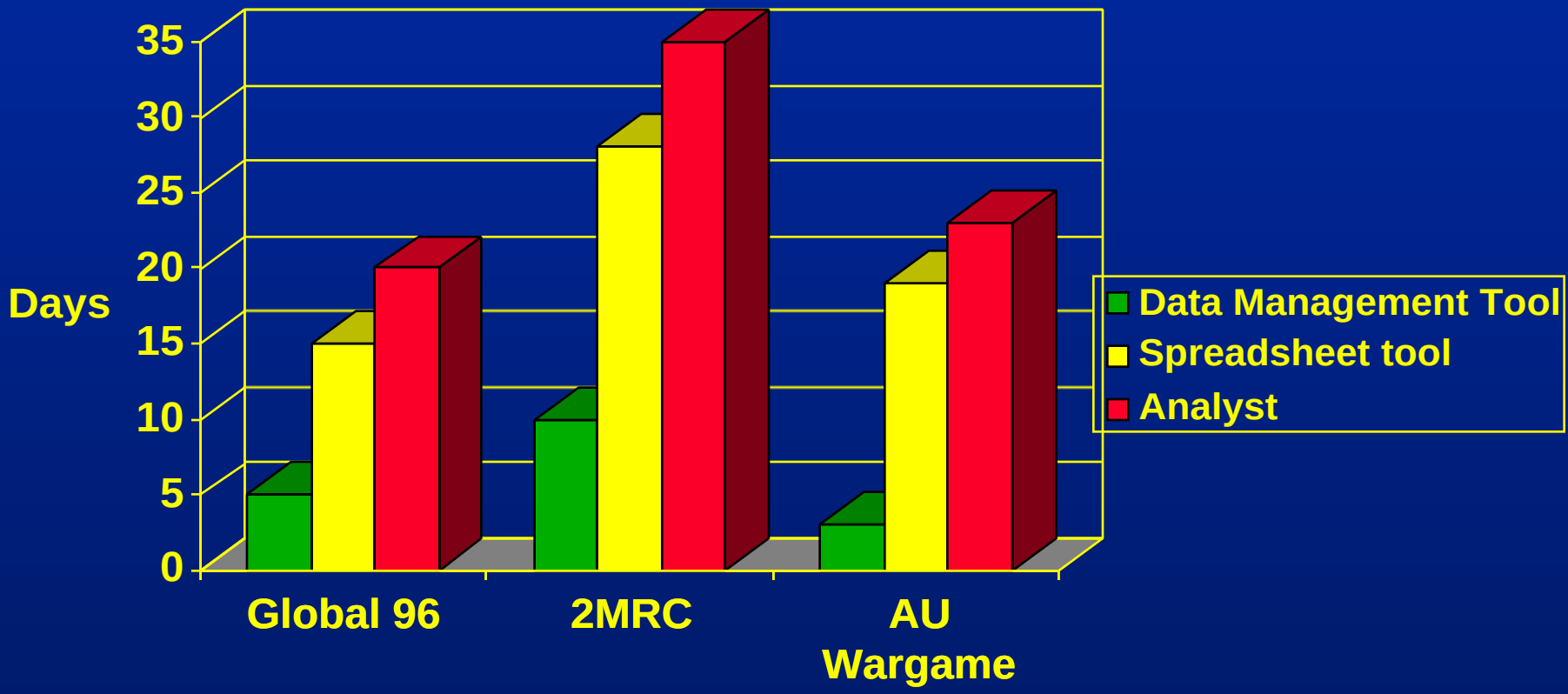
Allow analyst to track history of study

Diary Entry
7/2/97 1542
C-17 performance data altered to reflect changes in increased cargo payload

C-17 Performance Data File

UNCLASSIFIED

Days required to process study data using Data Management tool vs Spreadsheet tool vs Analyst only



Data Management = Information Power

- Securing and maintaining information dominance for the decision maker...from the individual warfighter to the commander in chief.
- Flexibility in supporting studies through seamless integration of analyses, models, and data.